

Electromagnetic Brakes & Clutches

Type: EMB-L-S Electromagnetic Disc Brake



- Fail Safe braking operation
- Long wearing brake disc lining
- High switching frequency
- Adjustable braking torque.
- No irritating brake noise
- Manual hand release.

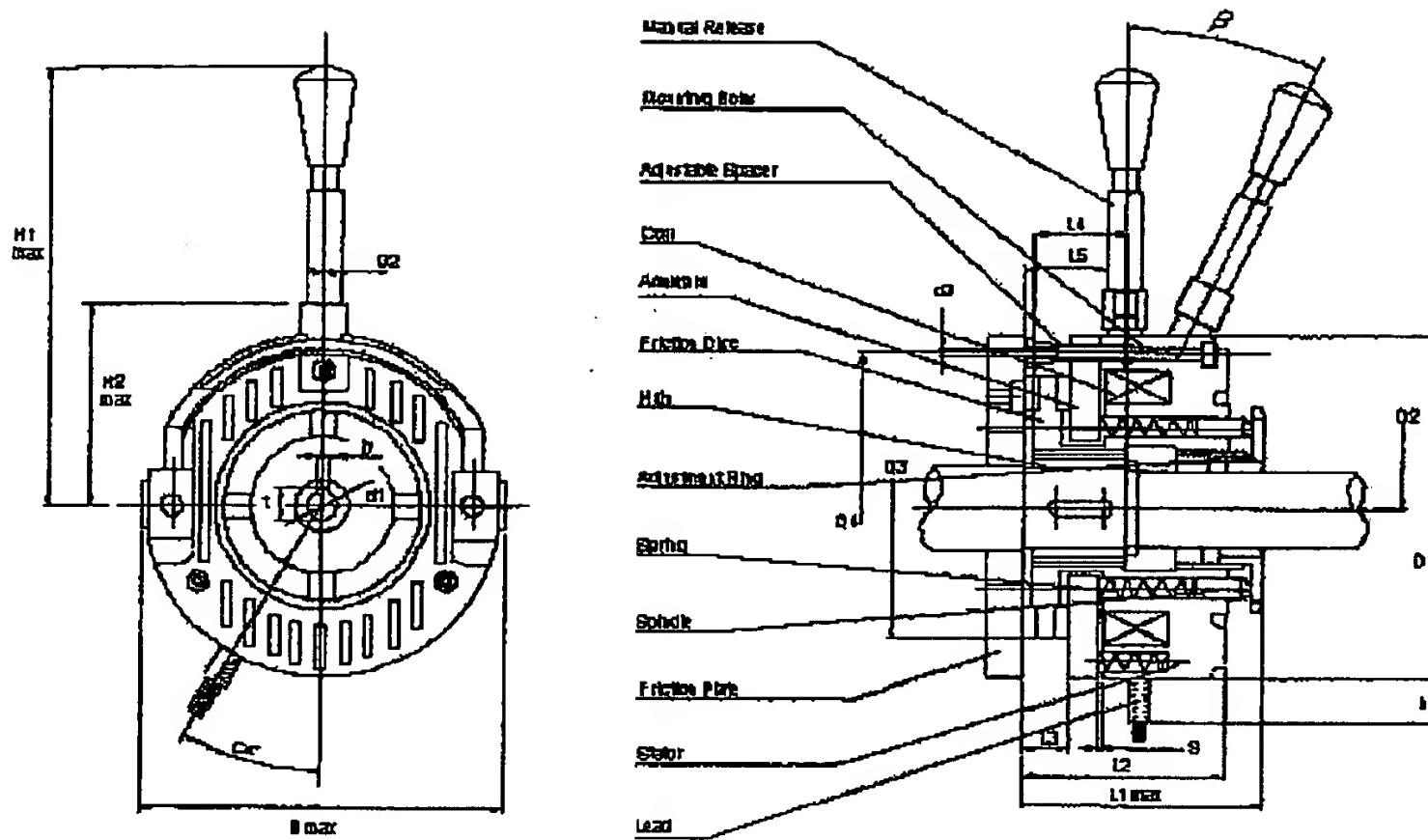
Brake Design:

The EMB-L-S is a Fail-Safe type, electromagnetic disc brake. This means the brake is applied when the current to the electromagnet is switched off. The electromagnet is dc operated, which makes it simple, eliminates hum and vibration, gives low energising current and makes it possible to adjust the brake engaging time. i.e. the time from when the current is interrupted to when the braking action commences. The coil of the electromagnet is dimensioned for continuous operation and it is encapsulated in the stator housing with an epoxy compound that makes it insensitive to moisture and vibration.

The braking torque can be adjusted manually and operation of the brake is unaffected by the mounting arrangement. When the electromagnet of the brake is de-energised, the braking torque is applied by pressure from a series of helical compression springs. The axial movement of the brake disc brings about a double-sided braking action without transmitting any thrust or impacts to motor shaft bearings. The friction material has high resistance to wear, good thermal conductivity and a uniform coefficient of friction even at high temperatures. The brakes can therefore handle high frequencies of braking without fading. The primary area of application is for electric motors. For this reason the EMB-L-S brake has been designed to take into consideration the dimensions of standard motors, however in principle their use is suitable for any application where fail-safe brakes are required. As standard, all EMB-L-S brakes are supplied with a Manual Hand release that allows safe movement of the load even when no power is available.

brake clutch

Page 2 of 7



Mounting.

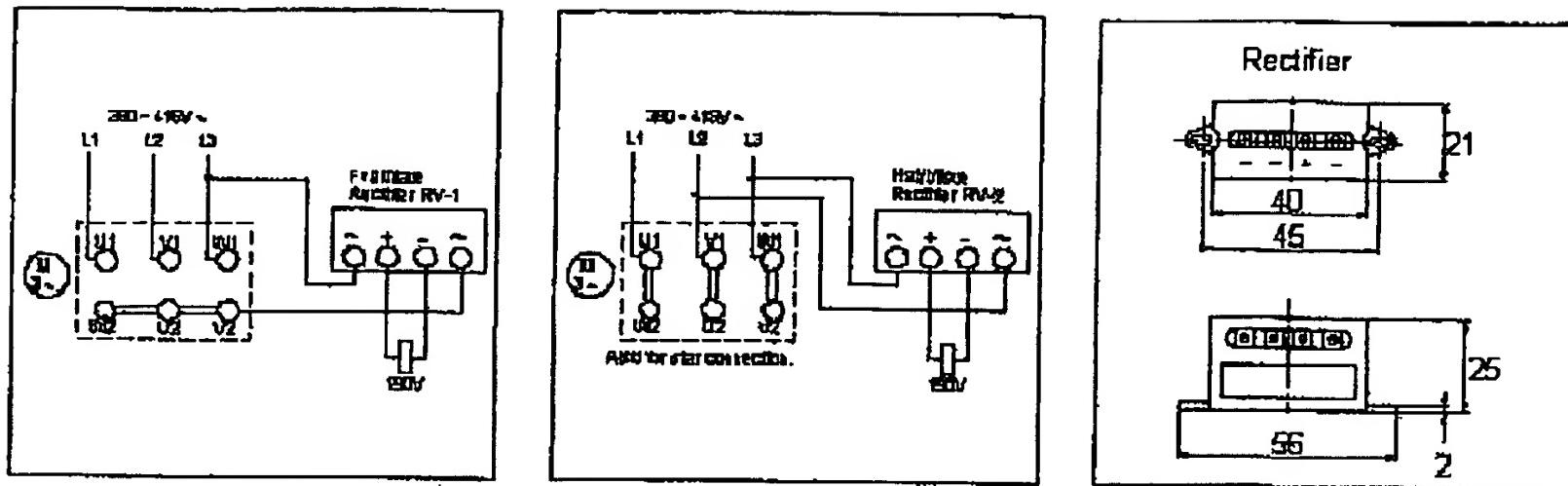
EMB-L-S brakes are supplied adjusted to the nominal values of braking torque and air gap. Maximum torque is achieved after a brief running-in period. When the wear of the friction disc has reached the minimum permissible lining thickness the air gap must be re-adjusted to the nominal air gap as recommended. The Friction Plate should be suitably mounted to the motor endshield or appropriate surface. Fit the Hub onto the drive shaft and secure axially. Fit the Friction Disc onto Hub and assemble Armature and Stator components. Set the air-gap clearance to the specified measurement using a feeler gauge and tighten the mounting bolts. The clearance should be uniform all around. The friction surfaces must be kept free from oil or grease.

Connection.

EMB-L-S brakes are supplied as standard with a coil voltage rated for 190V DC. Alternative voltage ratings such as 24V, 90V and 207V can be supplied upon request. The electromagnet operates reliably at voltages between 90% and 110% of the rated voltage. When the power supply is from an AC voltage source, the brake coil must be connected via a rectifier. 2 x rectifiers are available, Full Wave (type RV-1) for 240V AC input and Half Wave (type RV-2) for 415V AC input.

brake clutch

Page 3 of 7



Faster brake operation time can be achieved by separate switching of the AC input to the rectifier or the DC output to the electromagnetic coil. The operating times stated are based on DC switching at nominal air-gap. They are average values and are dependent upon coil temperature and the method of rectification.

Type	EMB-L-S4	EMB-L-S7.5	EMB-L-S15	EMB-L-S30	EMB-L-S60	EMB-L-S80	EMB-L-S150	EMB-L-S240
Torque (Nm)	4	7.5	15	30	60	80	150	240
Power (Watt)	28	25	30	40	52	58	85	140
Rated Speed for 100% Torque (rpm)	3600	3600	3600	3600	3600	3600	1800	1800
Operating Time Engage (<ms)	50	71	92	125	142	155	200	250
Operating Time Disengage (<ms)	50	70	75	120	140	180	280	320
Dimensions								
D1	86	103	127	147	165	188	215	252
D2	19	24	35	42	52	52	62	73
D3	58.5	75	95	115	120	149	173	203
D4	72	90	112	132	145	170	196	230
d1 (opt)								
d1 (std)	11	15	20/15*	25/20*	30/25*	35/30*	40/45*	60/65*
d2	8	8	10	10	12	12	16	16
d3	3xM4	3xM5	3xM6	3xM6	3xM8	3xM8	6xM8	6xM10
L1	58	65	65	72	82	92	108	125
L2	49	54	54	56	64	72.6	82.6	100.5
L3	11	11	11.5	11.5	14	14.5	16.5	16.5
L4	20	20	20	25	30	30	35	42
L5	20	22	24	25	32	34	36	45.5
H1	110	112	134	148	184	196	224	246
H2	55	62	74	90	101	112	128	148
t	12.9	17.5	22.9	28.4	33.4	38.4	43.6	69.4
B	93	107	132	152	168	195	226	252
b	4	5	6	8	8	10	12/14	16
S	0.2~0.3	0.2~0.3	0.2~0.3	0.3~0.5	0.3~0.5	0.3~0.5	0.3~0.6	0.6~0.8
α	30	30	30	30	30	30	30	30
β	15	15	15	15	12	12	12	10
k	400	400	400	400	400	400	400	400

Recommended ISO shaft tolerances - up to Ø 50mm = k6 & over Ø 50mm = m6. Hand release angle tolerance +5%

* Optional machined diameter for d1. All dimensions are in mm and subject to change without notice.

Page 3 - Declaration of Dr. David A. Turcic, Exhibit 4
Serial No. 10/100,211

http://www.emtmotor.com.au/brake_clutch.htm
PAGE 60/65 * RCVD AT 6/22/2005 1:37:35 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/0 * DNIS:8729306 * CSID:5036388601 * DURATION (mm:ss):17:38

4/22/2005

brake clutch

Page 4 of 7

Type: EMB-S-A Electromagnetic Brakes



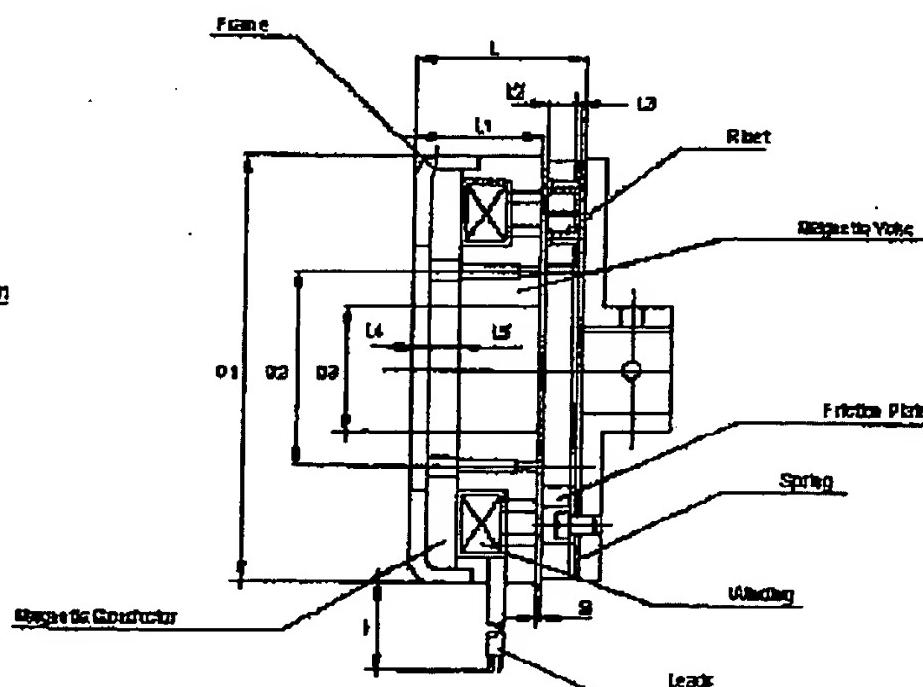
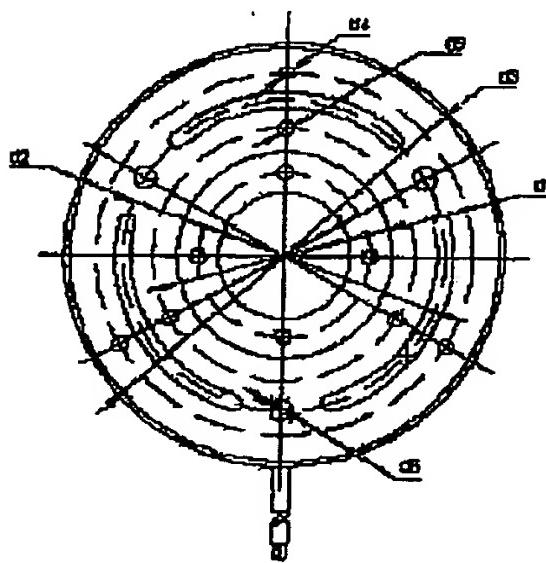
- 24V DC Coil
- Dry type single disc brake
- Quick braking from high speed
- Simple construction
- Reliable operation

Brake Design:

The EMB-S is a dry type electromagnetic brake with a single disk that can quickly achieve mechanical braking from high speed. The frame and yoke are mounted to a stationary component and the friction plate is attached to a rotating load via the spring disc. When no voltage is applied to the electromagnetic winding, the friction plate and the load will rotate freely. When a voltage is then applied to the electromagnetic winding, magnetism is produced in the magnetic yoke, therefore quickly braking the friction plate to a standstill. The electromagnet coil is operated by a 24V DC supply, which makes it simple to operate and easy to control.

The winding of the electromagnet is dimensioned for continuous operation and it is encapsulated in the magnetic yoke housing with an epoxy compound that makes it insensitive to moisture and vibration.

Operation of the brake is unaffected by the mounting position. The friction plate has a high resistance to wear, good thermal conductivity and a uniform coefficient of friction even at high temperatures. These are dry type brakes that can only be used in an oil free environment. The yoke face and the friction plate must be parallel and the load shaft must allow dimension "S" to be maintained.



Type	EMB-S12A	EMB-S25A	EMB-S35A	EMB-S50A	EMB-S100A	EMB-S160A	EMB-S200A	EMB-S250A
Torque (Nm)	12	25	35	50	100	160	200	250
Rated Voltage (V dc)	24	24	24	24	24	24	24	24
Power (Watt)	18	30	35	40	60	85	100	125
Rated Speed for 100% Torque (rpm)	4000	3000	3000	3000	3000	2500	2000	1500
Operating Time Engage (<ms)	65	120	130	140	200	240	300	330
Operating Time Disengage (<ms)	25	35	38	40	60	85	100	125
Dimensions (All dimensions are in mm and subject to change without notice)								
D1	88	117	125	150	170	220	206	214
D2	45	62	62	70	85	102	108	110
D3	36	45	45	55	70	82	90	90
d1	44	70	70	90	90	110	110	112
d2	64	95	95	118	118	152	152	152
d3	87	116	123	147	147	180	180	190
d4	4.2	4.2	4.2	5.2	5.2	6.2	6.2	6.2
d5	4xM5	4xM5	4xM6	4xM6	4xM8	4xM8	4xM8	4xM8
d6	4.5	6.2	8.5	8.5	8.5	8.5	8.5	8.5
L	28	31	35	35	40	49	55	58
L1	21.5	22.5	27.5	25	30	37.5	41.5	44.5
L2	6	6.5	6.5	7	7	10	10	12
L3	1	1	1	1	1	1.5	1.5	1.5
L4	6	7	7	7	7	8	8	8
LS	14	14	19	17.5	23	28	32	35
s	0.2 ~ 0.3	0.2 ~ 0.3	0.2 ~ 0.4	0.3 ~ 0.4	0.3 ~ 0.4	0.4 ~ 0.5	0.5 ~ 0.6	0.5 ~ 0.6
h	400	400	400	400	400	400	400	400

Type: EMC-I Electromagnetic Clutch

brake clutch

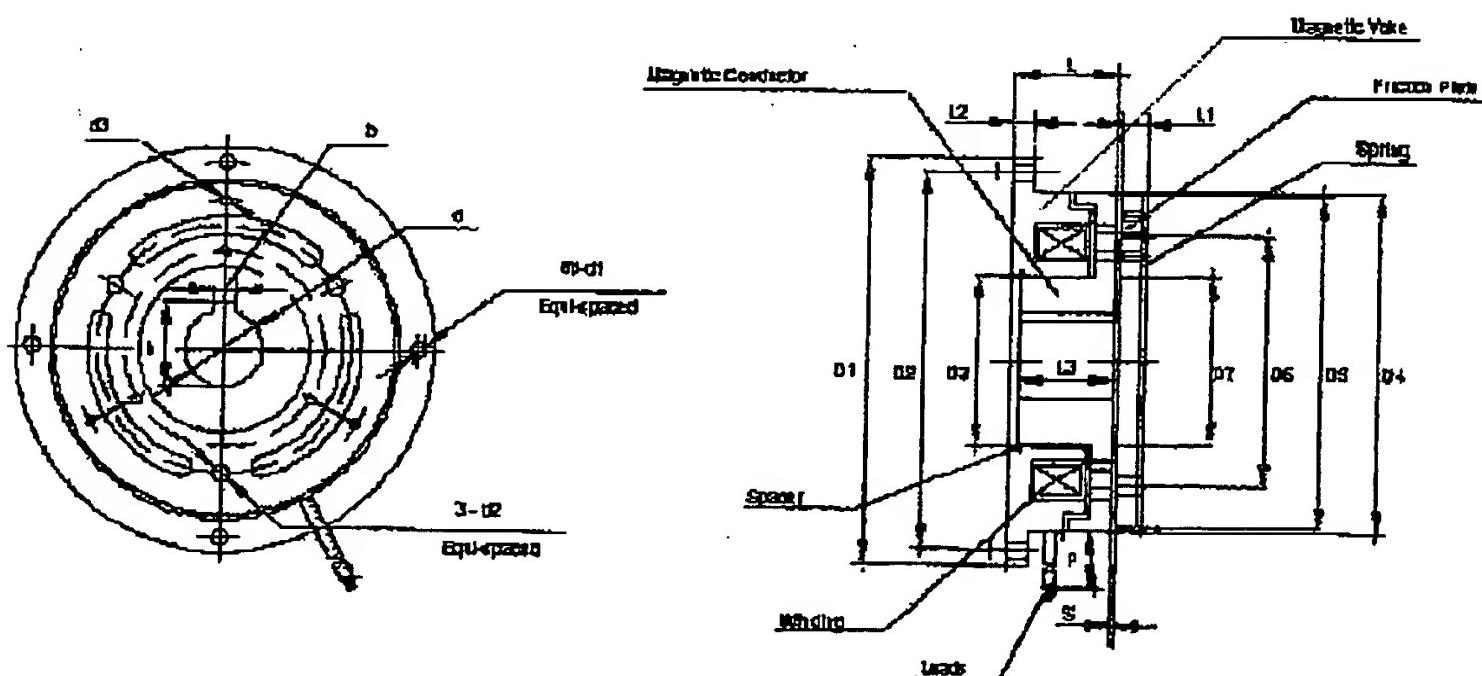
- 24V DC coil
- For power transfer, braking & overload protection in mechanical transmission systems.
- Independent of rotational direction.
- Simple construction.
- Reliable operation.



Clutch Design:

The EMC-I is an electromagnetic type clutch and friction plate assembly. It is specifically designed for the purpose of power transfer, braking, directional change and overload protection in a mechanical transmission system. The magnetic yoke is mounted onto a stationary component whilst independent shafts drive the magnetic conductor and the friction plate. The friction plate is attached to a rotating load via the spring disc. When no voltage is applied to the winding, the magnetic conductor and the friction plate will rotate independently. When a voltage is applied to the electro-magnetic winding, the friction plate and the magnetic conductor will be magnetically locked. The electromagnetic winding is operated by a 24V DC supply, which makes it simple to operate and control. The winding of the electro-magnet is dimensioned for continuous operation and it is encapsulated in the yoke housing with an epoxy compound that makes it insensitive to moisture and vibration. Operation of the clutch is unaffected by the mounting position. The friction plate has a high resistance to wear, good thermal conductivity and a uniform coefficient of friction even at high temperatures.

The magnetic conductor and the friction plate must be parallel and the drive shafts must allow dimension "S" to be maintained.



EMC-I Ratings Type	EMC-I-12	EMC-I-25	EMC-I-50	EMC-I-100	EMC-I-160	EMC-I-200
Torque (Nm)	12	25	50	100	160	200

Page 6 - Declaration of Dr. David A. Turcic, Exhibit 4
Serial No. 10/100,211

http://www.emtmotor.com.au/brake_clutch.htm

PAGE 63/65 * RCVD AT 6/22/2005 1:37:35 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/0 * DNIS:8729306 * CSID:5036388601 * DURATION (mm:ss):17:38

4/22/2005

Rated Voltage (Vdc)	24	24	24	24	24	24
Power (Watt)	20	22	32	40	45	55
Rated Speed for 100% Torque (rpm)	2500	2000	2000	1500	1500	1500
Operating Time - Engage (<ms)	75	120	140	230	260	300
Operating Time - Disengage (<ms)	25	35	45	60	90	115
Dimensions (All dimensions are in mm and subject to change without notice)						
D1	108	138	168	198	242	252
D2	100	130	160	185	228	236
D3	42	52	62	80	100	110
D4	90	120	150	170	212	220
D5	88	118	148	168	190	190
D6	66	94	118	118	152	152
D7	44	70	90	90	112	112
d (H8)	20	25	30	35	43	50
d1	5.5	5.5	5.5	8.5	8.5	8.5
d2	4.3	6.2	8.5	8.5	10.2	10.2
d3	4.2	4.2	5.5	5.5	6.5	6.5
L	27	31.5	33.5	38	44	50
L1	6.5	7.8	7.8	9	11.5	13.5
b	22.8	28.3	33.3	38.3	46.3	58.8
b	6	8	8	10	12	14
S	0.3	0.4	0.4	0.5	0.5	6
P	500	500	500	500	500	500
W	4	4	6	4	4	6



Contact Information

Electric Motor & Transmission Pty Limited

Sydney (Head Office and Sales): 39 Anvil Rd Seven Hills, 2147 N.S.W. Australia

Tel +61 2 9838 8181 Fax: 61 2 9838 8421

Melbourne (Sales) Tel + 61 3 9796 0355 Fax: + 61 3 9796 0377

E-mail General Information and Customer Support: sales@emtmotor.com.au

Or call from anywhere within Australia for local call cost Ph: 1300 13 9181

Copyright © 2005 Electric Motor & Transmission Pty Limited .

